



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 426 068 A2

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 90120701.9

(51) Int. Cl.⁵: **B60C 19/00**

(22) Date of filing: 29.10.90

(30) Priority: 30.10.89 JP 279777/89

(43) Date of publication of application:
08.05.91 Bulletin 91/19

(84) Designated Contracting States:
DE FR GB IT

(71) Applicant: **THE YOKOHAMA RUBBER CO., LTD.**
36-11, Shinbashi 5-chome Minato-ku
Tokyo, 105(JP)

(72) Inventor: **Tomioka, Kiyoshi**
2150, Shindo

Hiratsuka-shi, Kanagawa-ken(JP)

Inventor: **Watanabe, Susumu**

490-1041, Tokunobu

Hiratsuka-shi, Kanagawa-ken(JP)

Inventor: **Morikawa, Tuneso**

2216, Minamigaoka

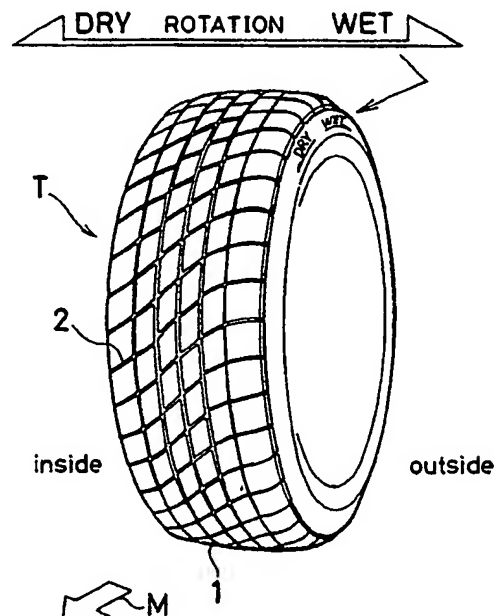
Hadano-shi, Kanagawa-ken(JP)

(74) Representative: **Görg, Klaus, Dipl.-Ing. et al**
Hoffmann, Eitle & Partner Arabellastrasse 4
(Sternhaus)
W-8000 München 81(DE)

(54) **Method of fitting pneumatic tires.**

(57) Tires (T) each having a tread pattern comprising sub-grooves (2) diagonally disposed in the same direction are fitted on the left- and right-hand sides of an automobile such that imaginary lines extending respectively from the sub-grooves (2) of the left- and right-hand tires of the same axes intersect each other on the front side of the automobile for the dry road running, while the imaginary lines intersect each other on the rear side of the automobile for the wet road running.

Fig.9



EP 0 426 068 A2

BEST AVAILABLE COPY

A pneumatic tire according to the present invention is for example a pneumatic radial tire as shown in Fig. 1. A carcass layer 2 is mounted on a pair of left and right bead cores 1, 1, and in a tread 3 two annular belt layers 4, 4 are disposed circumferentially around the tire in such a manner as to surround the outer circumference of a belt layer 3.

5 Organic fibers such as of nylon and polyester are used as a material for the carcass layer 2, and highly strong and rigid cords such as steel cords, Aramid cords (aromatic polyamide fiber cords) or the like are used as cords for the belt layer 4.

A belt cover layer (not shown) comprising nylon cords may be disposed on the outside of the outer belt layer 4 with a view to improving the high-speed running performance. The angle at which cords are
10 disposed in this belt cover layer is substantially 0° (parallel) with respect to the circumferential direction of the tire.

In a pneumatic tire according to the present invention, a tread pattern is formed by defining blocks by a plurality of annular straight grooves circumferentially extending around the tire in the surface of the tread 3, i.e., a tread surface 5 of the tire within the ground-contacting width (within the range from one of the shoulder portions to the other shoulder portion) thereof, and by disposing also a plurality of sub-grooves
15 obliquely intersecting those straight grooves in the tread surface 5 of the tire in the widthwise direction thereof. Figs. 2 and 3 show, respectively, examples of the tread pattern of tires actually fitted to an automobile when viewed from thereabove. In these figures, the reference numeral 1 denotes annular straight grooves provided in the circumferential direction EE' of the tire, the reference numeral 2 sub-grooves provided in the widthwise direction of the tire, and the reference numeral 3 denotes blocks defined by these grooves. In Fig. 2, the sub-grooves 2 are disposed in such a manner as to direct obliquely to the left with respect to the direction M in which the automobile moves, while in Fig. 3 the sub-grooves 2 are
20 disposed in such a manner as to incline also diagonally but to the left with respect to the direction M in which the automobile moves. The tread pattern shown in Fig. 2 is hereinafter referred to as tread pattern A, while the tread pattern shown in Fig. 3 is hereinafter referred to as tread pattern B.

It is preferable that the direction in which cords are disposed in a belt layer closest to the tread surface 5 of the tire (outer belt layer 4) is declined to the same direction in which the sub-grooves 2 are disposed with respect to the circumferential direction of the tire. This is because in a case where the sub-grooves and the cords of the outer belt layer 4 are declined in the same direction, the cords assist the sub-grooves 2
25 with rigidity and also serve to enhance the rigidity of the sub-grooves 2, improving the edge effect of the sub-grooves 2 to the road surface when running.

(1) According to the present invention, as shown in Fig. 4, tires having the above-mentioned tread patterns A and B are fitted to an automobile such that imaginary lines l, l' extending respectively from the sub-grooves 2 of the left- and right-hand tires confronting each other intersect each other on the front side of the vehicle for the dry running when viewed from above the automobile. In other words, a pair of the sub-grooves 2 of the left and right tires on the same axles form an inverted "V" of the alphabet when viewed
35 from above the automobile.

Since sub-grooves 2 are arranged such that they seem to form an inverted "V" when viewed from above the automobile, the sub-grooves 2 come to contact with the road surface such that they form a "V".
40 When the automobile runs a corner, the direction of the sub-grooves 2 of the tires on the outer side of the curve with respect to the direction of the running of the automobile, namely, the tires on the left-hand side of the vehicle when it makes a right turn on a corner or the tires on the right-hand side of the vehicle when it makes a left turn on the corner becomes substantially parallel or close to the parallel angle (0°) with respect to the direction in which the automobile moves, whereby the rigidity of road contacting-surface of the tire with respect to the same direction is greatly enhanced. Since this makes it possible to increase the
45 cornering force produced by the tires which are on the outer side of the curve and which receive the greatest load when the automobile runs a corner, it is possible to improve the dry running performance.

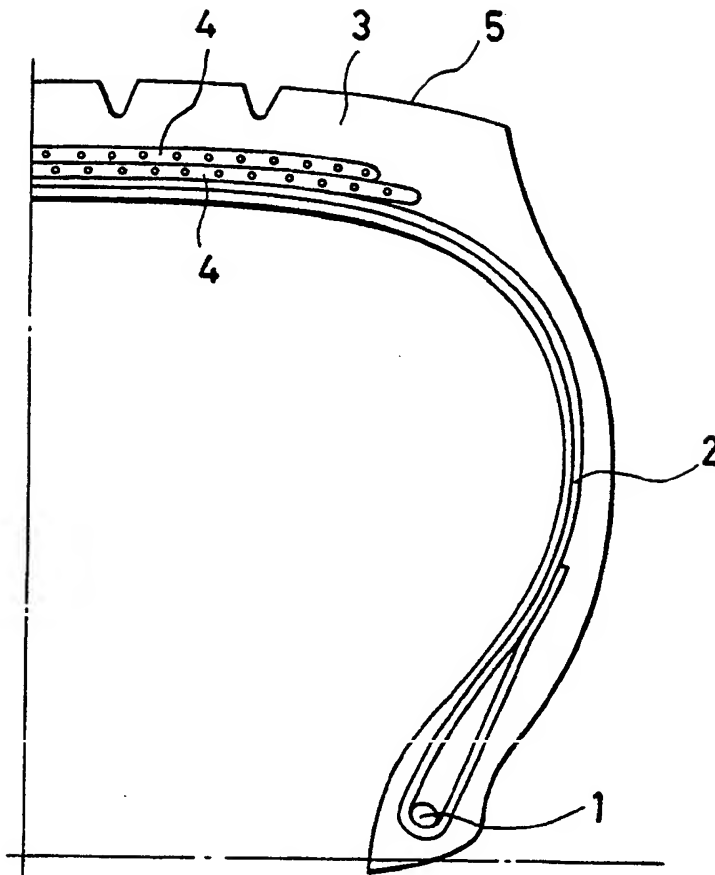
(2) Further, according to the present invention, as shown in Fig. 5, tires having the above-mentioned tread patterns A and B are fitted to an automobile such that imaginary lines l, l' extending respectively
50 from the sub-grooves 2 of the left- and right-hand side tires confronting each other in the widthwise direction of the automobile when viewed from thereabove intersect each other on the rear side of the automobile during the wet running. In other words, the sub-grooves 2 of the left and right tires on the same axles form a "V" of the alphabet when viewed from above the automobile.

Since the sub-grooves 2 seem to form a "V" of the alphabet when viewed from above the automobile,
55 the sub-grooves 2 come to contact with the road surface such that they form an inverted "V". Therefore, this allows water to be smoothly drained towards the inside of the automobile via the sub-grooves 2 of the tires which are on the outer side of the automobile when it runs a corner. Namely, when the automobile makes a right turn, the sub-grooves 2 of the tires fitted on the left-hand side of the automobile improve the

Table 1

	Tire 1	Tire 2	Tire 3	Tire 4	Tire 5
Tread Pattern	B	B	A	A	C
Carcass	Material 1000 d/2 polyester, 2 layers	same as Tire 1	same as Tire 1	same as Tire 1	same as Tire 1
Layer	Cord Angle 90° to Circumferential Direction	same as Tire 1	same as Tire 1	same as Tire 1	same as Tire 1
Belt Layers					
First Belt	Material 1x5 (0.25) Steel Cord 40 E	same as Tire 1	same as Tire 1	same as Tire 1	same as Tire 1
Layer (Inner)	Cord Angle 20° to Circumferential Direction (down to the right)	same as Tire 1 (down to the left)	same as Tire 1 (down to the left)	same as Tire 1 (down to the right)	same as Tire 1 (down to the right)
Second Belt	Material 1x5 (0.25) Steel Cord 40 E	same as Tire 1	same as Tire 1	same as Tire 1	same as Tire 1
Layer (Outer)	Cord Angle 20° to Circumferential Direction (down to the left)	same as Tire 1 (down to the right)	same as Tire 1 (down to the right)	same as Tire 1 (down to the left)	same as Tire 1 (down to the left)

Fig.1



BEST AVAILABLE COPY

Fig.6

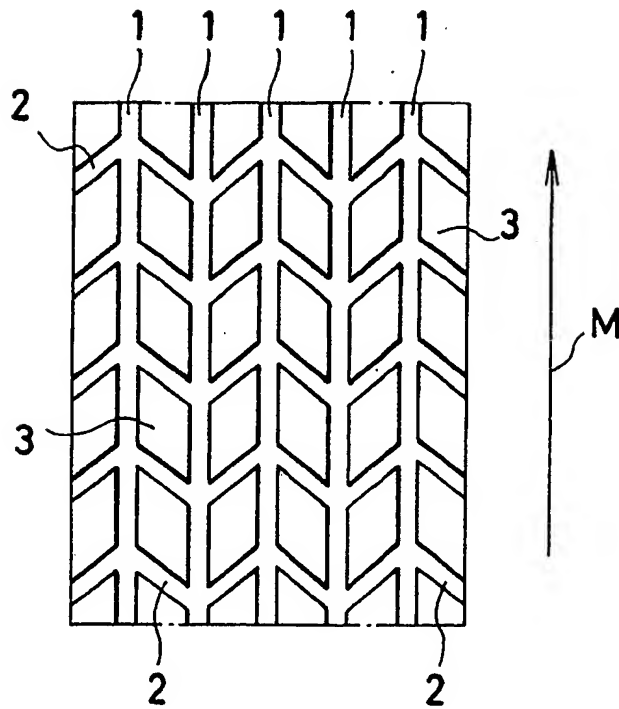
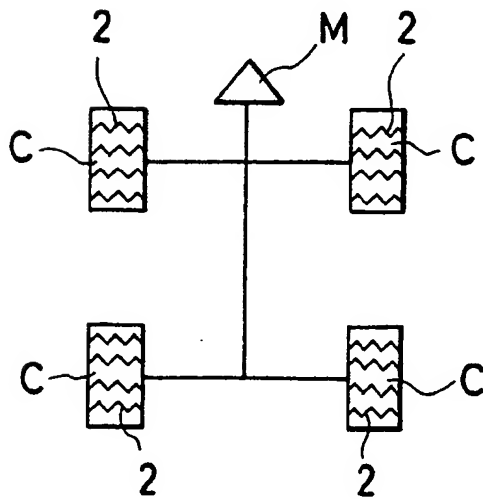


Fig.7





Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 426 068 A3

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: **90120701.9**

(51) Int. Cl.⁵: **B60C 19/00**

(22) Date of filing: **29.10.90**

(30) Priority: **30.10.89 JP 279777/89**

(43) Date of publication of application:
08.05.91 Bulletin 91/19

(84) Designated Contracting States:
DE FR GB IT

(88) Date of deferred publication of the search report:
06.11.91 Bulletin 91/45

(71) Applicant: **THE YOKOHAMA RUBBER CO., LTD.**
36-11, Shinbashi 5-chome Minato-ku
Tokyo, 105(JP)

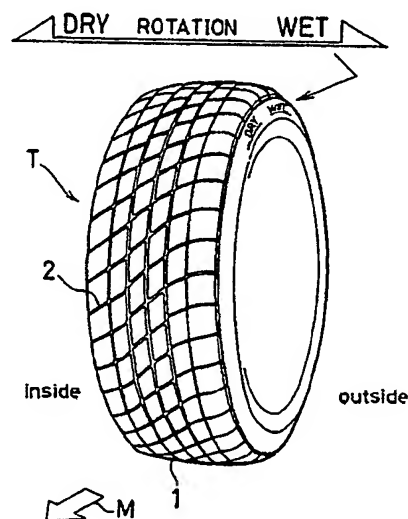
(72) Inventor: **Tomioka, Kiyoshi**
2150, Shindo
Hiratsuka-shi, Kanagawa-ken(JP)
Inventor: **Watanabe, Susumu**
490-1041, Tokunobu
Hiratsuka-shi, Kanagawa-ken(JP)
Inventor: **Morikawa, Tuneso**
2216, Minamigaoka
Hadano-shi, Kanagawa-ken(JP)

(74) Representative: **Görg, Klaus, Dipl.-Ing. et al**
Hoffmann, Eitle & Partner Arabellastrasse 4
(Sternhaus)
W-8000 München 81(DE)

(54) **Method of fitting pneumatic tires.**

(57) Tires (T) each having a tread pattern comprising sub-grooves (2) diagonally disposed in the same direction are fitted on the left- and right-hand sides of an automobile such that imaginary lines extending respectively from the sub-grooves (2) of the left- and right-hand tires of the same axles intersect each other on the front side of the automobile for the dry road running, while the imaginary lines intersect each other on the rear side of the automobile for the wet road running.

Fig.9



EP 0 426 068 A3

BEST AVAILABLE COPY